

Arsenic in the Environment

What is arsenic?

Arsenic is a naturally occurring element found in the earth's crust and is classified as a semi-metal or "metalloid". Arsenic can either be inorganic (combined with other elements, such as oxygen, chlorine or sulphur) or organic (combined with carbon and hydrogen). Many arsenic-containing substances, both inorganic and organic, are naturally occurring, while others are made by humans. Much of the arsenic contamination in soil is as a result of human activity. Inorganic forms of arsenic are of most concern to human health because of their toxicological properties. Exposure to arsenic can be through air, soil, water and food.

Arsenic in soil

All soil contains some amount of arsenic. In Ontario, 'background' arsenic concentrations up to 11 mg/kg (or parts per million) have been found in rural parkland areas while concentrations up to 18 mg/kg have been found in urban parkland areas. 'Background' represents concentrations in soil not affected (contaminated) by sources of contamination such as industry, etc.

Sources of arsenic exposure

Everyone is exposed to low levels of arsenic because arsenic occurs naturally in the environment. Most arsenic absorbed into the body is converted by the liver to a less toxic form that is excreted in the urine. Arsenic therefore does not have a strong tendency to accumulate in the body, except at high exposure levels. The most common source of exposure to organic arsenic is from food, particularly shellfish, beef, poultry, grains and dairy products. Other sources include:

1) Natural ores. Because arsenic is present in ore bodies, base-metal mining can result in the release of arsenic into the environment. That's why the areas of highest contamination are often in the vicinity of mining and smelting operations. People living in those areas may be exposed to higher concentrations in their soil, air, and drinking water.

Protecting our environment.



2) Agricultural soils. All soil contains some amount of arsenic. Arsenic can also be found in many agricultural soils, particularly old orchards, because it was historically used as an insecticide and herbicide. For young children, arsenic in soil is cause for concern because of their hand to mouth activity.

3) Coal. Since arsenic is also present in coal, elevated soil concentrations can occur around coal-burning facilities.

4) Pressure-treated woods. The use of arsenic-based wood preservatives has led to higher levels of arsenic in soils where there are wooden structures, such as fences and children's play equipment at parks, or other areas where pressure-treated wood is used for construction. Pressure-treated wood is still available for industrial use, but as of December 31, 2003, it is no longer used in residential applications. For further information on the health effects of pressure-treated wood (i.e. Chromated, Copper and Arsenate treated wood), please contact Health Canada's Pest Management Regulatory Agency at <http://www.pmra-ara.gc.ca>.

5) Drinking water. While drinking water may also be a source of arsenic in some areas in Ontario, treatment devices to remove arsenic are available for both municipal drinking water systems and private wells. Your local public health authorities can help you determine if your private water supply is contaminated with arsenic.

6) Dust. Inhaled inorganic arsenic dusts or fumes are of concern due to the increased risk of lung cancer. This has been observed mostly in humans exposed to high levels of airborne arsenic in or around operating smelters, but lower levels may increase lung cancer risk as well. Though uncommon, inorganic arsenic dusts may produce mild skin conditions.

Arsenic in backyard vegetables

Edible portions of plants are not of concern. Most vegetables are sensitive to arsenic in soil and will fail to grow let alone accumulate arsenic to levels that may be hazardous to health. The highest arsenic concentrations tend to be in root crops, particularly beets and radishes. Green beans, which are sensitive to arsenic, are good indicators of arsenic in soil. If they grow well in a garden, it is unlikely that the uptake of arsenic in other vegetables will be high enough to pose a health risk.

How can arsenic affect my health?

The International Agency for Research on Cancer considers arsenic to be a human carcinogen. The inorganic arsenic compounds are generally associated with arsenic's toxic effects on various body organs. Population studies indicate that chronic or long-term arsenic exposure can lead to various forms of cancer, especially in lungs, skin, and the bladder. Non-cancer effects include various skin conditions and vascular disease. The extent of any adverse impact of arsenic depends on the amount of exposure as well as the chemical form of the arsenic.

What can I do to reduce my family's exposure to arsenic?

If you live in an area where arsenic is a concern, there are a number of steps you can take to reduce your exposure to arsenic and other metals in soil or dusts:

- Wash your hands and face after working or playing outdoors and before eating.
- Clean your home regularly using a damp mop or damp cloth; vacuuming or sweeping can increase dust levels in the home.
- Avoid bringing outdoor dirt inside by removing outdoor shoes.
- Brush pets often as their fur collects dust. Pets are known to carry contaminated dusts into houses and should be brushed outside, if possible.
- Thoroughly wash vegetables and peel root crops before eating. Washing vegetables has been shown to greatly reduce the levels of arsenic.

- Wear gloves and a protective mask when digging or excavating soil around your home.
- Do not use excavated soil in vegetable gardens. You can remove the top layer of contaminated soils and cover it with clean soil, sod, paving stones or decking.

How can I get more information?

If you live near a source of arsenic and you suspect your soil may be contaminated, contact your local Ministry of the Environment office. You will find the telephone number in the blue pages of your telephone directory.

Contact your local health unit or your medical doctor if you are concerned about being exposed to arsenic or have questions about health effects.

For more information visit www.ene.gov.on.ca